2. PURPOSE AND NEED FOR AGENCY ACTION

2.1 Proposed Action

The proposed Federal action is for the U.S. Department of Energy (DOE) to provide, through a Cooperative Agreement with Kentucky Pioneer Energy, L.L.C (KPE), a subsidiary of Global Energy, Inc., approximately $78 million in cost-shared funding support for the design, construction, and operation of the proposed Kentucky Pioneer Integrated Gasification Combined Cycle (IGCC) Demonstration Project. The total cost of the project is currently estimated to be $432 million. The IGCC is a technology that converts coal into clean gas, virtually free of sulfur and particulates, burns the gas in a combustion turbine to generate electricity, and then captures the heat to drive a steam turbine, which generates additional electricity.

The proposed project would include four coal and refuse derived fuel gasification units and a 540 megawatt (MW) synthesis gas-fired combined cycle power plant in rural Clark County, Kentucky. KPE would use a licensed gasification technology to fuel an electric generating facility. The facility would be designed for at least 20 years of commercial operation, with Global Energy, Inc., providing data from the proposed Clean Coal Technology (CCT) demonstration for the first year. The proposed project would be the first commercial scale application of the British Gas Lurgi (BGL) gasification technology in the United States. This technology includes the gasification of a blend of coal and Refuse Derived Fuel (RDF) pellets and the use of the synthesis gas (syngas) product as a clean fuel in combined cycle generator sets. The project would also incorporate the operation of a high-temperature molten carbonate fuel cell powered by syngas. This would also be the first commercial scale demonstration of a molten carbonate fuel cell operating on syngas.

The IGCC system that would be demonstrated in this project is suitable for repowering both existing and new power plants. The technology is expected to be adaptable to a wide variety of potential market applications because of several factors. First, pilot scale tests of the BGL gasification technology have successfully used a wide variety of coals within the United States. Also, the highly modular approach to system design makes the BGL-based IGCC and molten carbonate fuel cell competitive in a wide range of plant sizes. In addition, the high efficiency and environmental performance of the system are competitive with other fossil-fuel-fired power generation technologies.

The Kentucky Pioneer IGCC Demonstration Project facility would be designed for at least 20 years of commercial operation. The first year of facility operation would demonstrate the BGL gasification and fuel cell technologies. Construction of the entire facility would require approximately 30 months.

2.2 Purpose and Need for Agency Action

The goal of the CCT Program, as established by Congress, is to make available to the United States energy marketplace advanced and environmentally responsive technologies that will help alleviate pollution problems from coal utilization. Solutions to a number of key energy issues are directly dependent upon the degree to which coal can be considered as an available energy option. These issues include: (1) long-range requirements for increased power demand; (2) need for energy security; and (3) increased competitiveness in the international marketplace.

The proposed Kentucky Pioneer IGCC Demonstration Project was selected as one of the candidate projects that would best further the objectives identified in the CCT Program. The purpose of this proposed project is to demonstrate and assess the reliability, availability, and maintainability of a utility-scale IGCC system using high-sulfur bituminous coal and an RDF blend in an oxygen-blown, fixed-bed, slagging gasifier and the operability of a molten carbonate fuel cell powered by syngas. The proposed project was selected

for further consideration by DOE to demonstrate the combined removal of sulfur dioxide, nitrogen oxides, and particulate matter using BGL gasification and fuel cell technology. The objective is to achieve emission levels lower than the limits established by the *Clean Air Act* while producing power more efficiently and at a lower cost than conventional coal utilization technologies.

The proposed project could meet DOE's objective to generate technical, environmental and financial data from the design, construction, and operation of the facilities at a scale large enough to allow the power industry to assess the potential of BGL gasification and fuel cell technologies for commercial application. This data could demonstrate that IGCC power plants, based on this technology, could be built cost effectively, with thermal efficiencies that would significantly reduce electric power costs over more conventional technologies, which would constitute a successful demonstration.

Global Energy, Inc., is proposing to construct the Kentucky Pioneer IGCC Demonstration Project at East Kentucky Power Cooperative's (EKPC) existing J.K. Smith Site due to existing and projected electrical loads on the EKPC system. Electrical load forecasts outlined in EKPC's *1998 Power Requirements Study* indicates that the total energy requirements for EKPC's system are expected to increase by 3.0 percent per year through 2017. Net winter peak demand is expected to increase by over 1,600 MW or 3.3 percent per year and net summer peak demand is projected to increase by approximately 1,250 MW or 3.0 percent per year. Peak is projected to increase from 2,031 MW in 1998 to 2,394 MW in 2003 and 3,478 MW in 2015. Based on this load growth, EKPC will need additional power supply resources of 625 MW in 2003. The Kentucky Pioneer IGCC Demonstration Project is being recommended by Global Energy, Inc., to satisfy the majority of the projected electrical load growth on EKPC's existing system while demonstrating a CCT. This environmental impact statement will help DOE to decide whether or not to provide $78 million in cost-shared funding for the Kentucky Pioneer IGCC Demonstration Project.

The need for greater electrical generation in the region is demonstrated by the stated intention of Global Energy, Inc., to proceed with the construction of the two combined cycle combustion turbines (CT) regardless of whether DOE provides cost-shared funding for the proposed project. The need is further shown by EKPC's plans to construct four new CT electric generating units (addressed in Section 5.14, Cumulative Impacts) to provide peaking service alongside their three existing peaker CTs at the J.K. Smith Site. The construction of the 540 MW power plant will help to assuage the need for electricity in the region. The intent of the proposed project is to demonstrate a more environmentally-friendly method of electric generation and help to reduce the impacts associated with conventional generation technologies. The high-temperature molten carbonate fuel cell demonstration would supply an additional 2 MW to the local power grid.

If enough data is generated, the proposed Kentucky Pioneer IGCC Demonstration Project could advance DOE's objective of demonstrating technical, economical, and environmental viability of commercial scale operation of coal-based power generation technologies with a module that could be replicated for use by utilities and other industries in the near future. This project represents an integration of the latest developing gasification and power generation technologies to provide industry and electric utilities with a major source of clean, dependable, and economical electricity.

The commercialization of environmentally progressive technologies using coal, which is a relatively inexpensive fuel source, is important to the electric utility industry as it endeavors to balance environmental costs and benefits of generating electricity. The proposed Kentucky Pioneer IGCC Demonstration Project could make a significant contribution to the new technologies available to electric-generating utilities, independent power producers, and co-generators in their efforts to produce power economically from abundantly available coal in an environmentally acceptable way.